erage molecular weight of from about 200 to about 3,000, and preferably with an average molecular weight of from about 200 to about 700. plasticizers substantially as described are manufactured and available under the tradename "Carbowax". In any case, the plasticizer is utilized in an amount equivalent to at least about 5 wt. percent of the sol, and preferably from about 10 to about 20 wt. percent.

The alumina sol may also be prepared to contain a non-ionic surfactant, suitably at least about 0.05 wt. percent. Suitable nonionic surfactants include "the various" and well known polyoxyethylene alkylphenols, polyoxyethylene alcohols, polyoxyethylene esters of fatty acids, polyoxyethylene mercaptans, polyoxyethylene alkylamines, polyoxyethylene alkylamides, and the like. A polyoxyethylene alcohol with an average molecular weight of from about 200 to about 500 is particularly suitable. The surfactant may be included in the sol to facilitate penetration and even distribution of the sol, for example, in the fissures or clefts common to a honeycomb support structure. Preferably, the nonionic surfactant is utilized in an amount comprising from about 0.05 to about 0.5 wt. percent based on the weight of the alumina sol.

The low surface area ceramic support may be impregnated with the described sol by impregnating techniques known to the art. Thus, the ceramic support may be soaked, dipped, suspended, or otherwise immersed in the sol, suitably at ambient temperature conditions. The impregnation process may be repeated one or more times to deposit a satisfactory thin uniform coating on the surface of the ceramic support structure. In any case, the impregnated support is subsequently calcined in an oxidizing atomsphere at a termperature of at least about 425°C. to form the desired thin uniform high surface area alumina film deposited on the ceramic support.

The impregnated ceramic support is subsequently calcined over a period of from about 1 to about 5 hours at a temperature of from about 425° to about 1,100°C. In some instances it may be desirable to reduce or substantially eliminate the halogen associated with the alumina, and this is readily accomplished by effecting calcination in a steam-air atmosphere, for example in an air atmosphere containing from about 20 wt. percent to about 50 wt. percent steam.

The high surface area, alumina-coated, ceramic honeycomb structures of this invention are particularly adapted to the manufacture of a unitary catalyst element for the conversion of exhaust gases emanating from an internal combustion engine. Thus, the alumina-coated honeycomb support can be further composited with one or more catalytically active metallic components in the reduced or oxidized state. In the treatment of said exhaust gases, platinum has been shown to be a particularly effective catalyst. Other metallic components particularly active in this respect include copper oxide, and especially copper oxide in combination with one or more promoter oxides including the oxides of iron, nickel, cobalt, chromium, manganese, tin, vanadium, and the like. Still other catalytically active materials including the reduced or oxidized form of palladium, tungsten, molybdenum, silver, gold, rhenium, germanium, etc., known for their activity with respect to various catalytic processes, are readily composited with the support material of this invention.

The catalytic components are applied to the alumina-coated substrate by conventional methods which generally entail immersing the support in an aqueous solution of a precursor compound of a desired metallic component, and adsorbing and impregnating the same on the high surface area alumina coating. For example, the support is impregnated with an aqueous solution of chloroplatinic acid, platinum chloride, ammonium chloroplatinate, dinitrodiamino platinum, etc., and the impregnated support subsequently oxidized and/or reduced to yield the platinum component in an oxidized or reduced state. Precursor compounds of the catalytic metals which decompose upon calcination to provide the oxides can be used. These include the soluble hydroxides, carbonates, nitrates and/or organic salts of the various catalytically active metals, as well as ammonium salts such as ammonium metavanadate, and the like.

The following example is presented in illustration of the method of this invention and is not intended as an undue limitation on the generally broad scope of the invention as set out in the appended claims.

EXAMPLE I

An alumina sol was prepared by digesting an excess of aluminum in aqueous hydrochloric acid under reflux conditions (98°–115°C.). The sol contained 14.2 wt. percent aluminum in a 1.5:1 ratio with the chloride anion content thereof, and had a specific gravity of 1.4. About 1,860 milliliters of the sol thus prepared was admixed with 465 milliliters of a polyethylene glycol plasticizer having an average molecular weight of about 600 (Carbowax), and with 1.52 grams of a polyoxyethylene alcohol nonionic surfactant having an average molecular weight of about 240 (Antarox BL–240).

A cordierite ceramic honeycomb structure weighing 447.3 grams was then immersed in the described alumina sol with a gentle reciprocating movement in the direction of the parallel channels to insure contact and an even distribution of the sol on the honeycomb surface. After about 4 minutes, the impregnated honeycomb was removed and blown free of excess sol with a stream of air. The impregnated honeycomb, containing about 229.2 grams of alumina sol adhered to the surface thereof, was dried for about 2 hours in a forced-draft furnace at 150°C. The dried, impregnated honeycomb was subsequently heated to 540°C. over a ½ hour interval and then calcined at 540°C. for 2 hours in a stream of air containing about 30 wt. percent steam. While the ceramic honeycomb initially exhibited a surface area of less than about 1 m^2/gm, the alumina-coated product had a surface area of about 21 m^2/gm.

I claim as my invention:

1. A method of depositing a high surface area alumina as a uniformly thin film on a relatively low surface area refractory support which comprises:

a. impregnating said support with an alumina sol containing at least about 5 wt. percent of a soluble polyethylene glycol (organic) plasticizer having an average molecule weight of from about 200 to about 3000; and

b. calcining the impregnated support at a temperature of at least about 425°C.

2. The method of claim **1** further characterized in that said refractory support is a ceramic honeycomb structure of cordierite.